

CLAIMS

1. A fixture for calibrating an instrumented fastener comprising:
- 5 an upper member;
- a cap member removably attached to the upper member, the cap member including an opening formed therein to receive an upper portion of the fastener;
- 10 a lower member positioned adjacent the cap member, the lower member including an opening formed therein;
- a removable insert positioned in the lower member opening to receive a lower portion of the fastener.
2. The fixture of claim 1 wherein the cap includes a joint specific spacer section to provide a predetermined position of the fastener within the fixture.
- 15 3. The fixture of claim 1 wherein the upper member includes a threaded extension for threaded attachment to the cap member.
- 20 4. The fixture of claim 3 wherein the upper member includes a chamber formed therein for receiving the upper portion of the fastener.

5. The fixture of claim 4 wherein the upper member further includes a port formed therein, the port allowing cable access to the upper member chamber.

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6. The fixture of claim 1 wherein the cap member opening is a threaded opening.

7. The fixture of claim 1 wherein the cap member opening is an unthreaded opening.

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8. The fixture of claim 1 wherein the lower member opening is a threaded opening.

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9. The fixture of claim 1 wherein the lower member further includes a chamber formed therein.

10. The fixture of claim 1 wherein the lower member further includes a port formed therein, the port allowing cable access to the lower member chamber.

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11. The fixture of claim 8 wherein the removable insert includes a threaded outer portion for threaded engagement with the lower member opening.

12. The fixture of claim 11 wherein the removable insert includes a threaded opening, the threaded opening including a configuration adapted to threadably engage the lower portion of the fastener.

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13. The fixture of claim 12 wherein the removable insert is one of a plurality of removable inserts, each of which include a threaded opening adapted to threadably engage a fastener with a different engaging configuration.

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14. The fixture of claim 1 wherein the upper member and the cap member comprise an upper section.

15. The fixture of claim 14 wherein the lower member and the removable insert comprise a lower section.

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16. The fixture of claim 15 wherein the upper section and the lower section each include an attachment portion.

17. A method comprising:
- 5 positioning a fiber-optic sensor within a fastener;  
positioning a removable insert member within a lower  
member of a calibration fixture;  
positioning a cap member adjacent to the removable insert  
member;  
inserting the fastener through an opening in the cap  
member;  
10 screwing a lower threaded portion of the fastener into the  
threaded insert member;  
attaching the cap member to an upper section of the  
calibration fixture;  
operably connecting the fiber-optic sensor to a measuring  
15 device;  
applying a predetermined tensile force to the fastener; and  
recording a measurement from the fiber-optic sensor.
18. The method of claim 17 wherein the predetermined tensile  
20 force is applied to the fastener by applying a tensile force to the upper and lower  
members of the calibration fixture.

19. A system for calibrating an instrumented fastener  
comprising:

- 5 means for positioning a fiber-optic sensor within a fastener;  
means for positioning a removable insert member within a  
lower section of a calibration fixture;  
means for positioning a cap member adjacent to the  
removable insert member;  
means for inserting the fastener through the cap member;  
10 means for securing a lower threaded portion of the fastener  
within the threaded insert member;  
means for attaching the cap member to an upper section of  
the calibration fixture;  
means for operably connecting the fiber-optic sensor to a  
15 measuring device;  
means for applying a predetermined tensile force to the  
fastener; and  
means for recording a measurement from the fiber-optic  
sensor.

20. A system for calibrating an instrumented fastener comprising:
- 5 an upper assembly adapted to receive an upper portion of the fastener;
- a lower assembly adapted to receive a lower portion of the fastener; and
- 10 means for attaching the upper and lower assemblies to a tension-producing device, wherein the application of a predetermined tensile force by the tension-producing device across the upper and lower assemblies produces a strain in the fastener detectable by the instrument.